

REMARKS

This communication is in response to the non-final Office Action issued November 7, 2006. The Examiner rejected claims 13, 22, and 23 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The Examiner rejected claims 13 and 35 under 35 U.S.C. § 102 in view of U.S. Patent No. 5,023,048 to Mardon *et al.* ("Mardon '048"). The Examiner rejected claims 13, 22, 23, and 35-40 under 35 U.S.C. § 103 in view of varying combinations of Mardon '048 and U.S. Patent Nos. 5,373,541 to Mardon *et al.* ("Mardon '541") and 5,790,623 to Van Swam ("Van Swam").

Comments Regarding the Board's Remand

In the October 27, 2006 Board Order remanding the application back to the Examiner, the Board instructed the Examiner to consider *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368 (Fed. Cir. 2005) and *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991 (Fed. Cir. 2006). The Examiner summarily dismissed the cases, relying on alleged "differences in facts sets between the present application and the *Perricone* and *Atofina* cases." It is noted that the Examiner did not elucidate this statement.

The Applicants disagree with the Examiner's conclusory statement. Both of these cases dealt with the issue of whether a range in a reference anticipated a claimed range. In *Perricone*, the reference range entirely encompassed the claimed range, and the referenced and claimed ranges did not "significantly deviate." *Perricone*, 432 F.3d at 1377. As a result, the Court held that the claimed range was anticipated. *Id.* In *Atofina*, on the other hand, the broadest referenced range completely encompassed the claimed range, but the Court held this did not result in anticipation because of the "considerable difference" in the ranges. *Atofina*, 441 F.3d at 999. When evaluating the more narrow referenced range and the claimed range, the Court held that

the claimed range was not anticipated because the referenced and claimed ranges merely overlapped. *Id.* at 999-1000. Of particular import here is the following language of the *Atofina* opinion:

Moreover, the disclosure of a range of 150 to 350 °C does not constitute a specific disclosure of the endpoints of that range, *i.e.*, 150 °C and 350 °C, as Great Lakes asserts. The disclosure is only that of a range, not a specific temperature in that range, and the disclosure of a range is no more a disclosure of the end points of the range than it is of each of the intermediate points.

... Once again, although there is a slight overlap, no reasonable fact finder could determine that this overlap describes the entire claimed range with sufficient specificity to anticipate this limitation of the claim. The ranges are different, not the same.

Id. at 1000.

The synthesis of these opinions thus seems to be that a referenced range anticipates a claimed range if it completely encompasses a claimed range, but only if there are not significant differences in the ranges; there can be no anticipation if the referenced and claimed ranges merely overlap. Applying this instruction to the instant application, the Mardon '048 tin range (0.35-0.65 %), iron range (0.20-0.65 %), and niobium range (0.35-0.65 %) do not completely encompass the claimed tin range (0.65-1.6 %), iron range (0.3-0.6 %), or niobium range (0.65-1.6 %), so Mardon '048 does not anticipate the instant claims.

Thus, the Examiner's anticipation rejections are improper and must be withdrawn.

Claim Rejections Under 35 U.S.C. § 112, First Paragraph

In sections 5 and 6 of the Office Action, the Examiner rejected claims 13, 22, and 23 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner cited the recited range of oxygen (up to 1600 ppm) as not being supported by the specification.

The Examiner has maintained these same rejections without fully replying to the Applicants' remarks regarding the same. The Applicants have explained why the cited passage of claim 13 ("the alloy having a quality and impurity level, including up to 1600 ppm O") is fully supported. As expressly stated in the written description, "small amounts of Si and O *may* exist in the alloy." Written Description at page 9, lines 20-21 (emphasis added). Clearly, this means that small amounts of oxygen may exist in the alloy or there may be no oxygen in the alloy. The Appellants expressly state a range of oxygen that typically may be expected in the alloy - 500-1600 ppm. *Id.* at page 9, lines 29-30. This, however, is not the only amount of oxygen that may be present. As previously established, *small amounts* of Si and O may exist in the alloy. If 500-1600 ppm qualifies as a "small amount" of oxygen, surely 0-500 ppm must also qualify as a small amount of oxygen. Furthermore, because the exemplary range of oxygen is described as being *typical*, it cannot be read to be the *only* range possible. *See Id.* at page 9, lines 21-22. Finally, it is nonsensical to think that 500-1600 ppm is the only amount of oxygen qualifying as an impurity level. *See Id.* at page 9, lines 17-18, 20-21.

The Applicants respectfully request the Examiner to expressly explain, given that 500-1600 ppm oxygen constitutes a "small amount," why would an amount of less than 500 ppm oxygen not also constitute a "small amount of ... O[xygen]"?

Additionally, the Examiner's assertion that the specification does not "reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention" is nonsensical. As previously explained, oxygen *may* be present *at an impurity level*. The alloy elements are well known and the specific amounts of the alloy elements are specified by the Applicants. The Applicants also clearly specify that the amount of oxygen, if present at all, is to be kept to a low amount. Thus, the presence of oxygen,

if kept below the specified level, has no bearing on the efficacy of the claimed invention. The Applicants' specification clearly explains this to the artisan skilled in the art of producing alloys, and the artisan skilled in the art of producing alloys would understand and be able to make the claimed invention based on the Applicants' specification.

Thus, "up to 1600 ppm O" is disclosed and supported in the written description, and the Examiner's rejections under 35 U.S.C. § 112, first paragraph, of claims 13, 22, and 23 are improper and must be withdrawn.

Claim Rejections Under 35 U.S.C. § 102

In sections 7 and 8 of the Office Action, the Examiner rejected claims 13 and 35 under 35 U.S.C. § 102 in view of Mardon '048.

It is well settled that for a rejection of a claim under 35 U.S.C. § 102 to be proper, each and every element as set forth in the claim must be found in a single reference. See, for example, MPEP § 2131. For at least the reasons stated below, the Examiner's rejections of the claims do not satisfy this burden.

The Applicants have previously provided reasons why Mardon '048 is not relevant, which comments are incorporated herein. Furthermore, the rejections are improper and must be withdrawn based on the comments provided above in the section entitled "Comments Regarding the Board's Remand."

In the Office Action, the Examiner stated "The Examiner regards the alloy composition of Mardon et al to be disclosed with sufficient specificity to be anticipatory at the end points of the claimed ranges of Sn and Nb. Alloy compositions are quite specific, leaving no doubt as to what composition is disclosed or claimed, particularly in view of the limited number of elements present within the composition at issue." The Applicants disagree. First, the Examiner still

apparently refers to the thinner outer duplex layer of Mardon '048. The Examiner misinterprets the claimed subject matter in view of Mardon '048 for the reasons provided earlier (for example, in the Substitute Appeal Brief). The claims state that the cladding tube is made of the alloy in question, so it is improper to cite the outer, thin layer of Mardon '048 because the tube of Mardon '048 is made essentially of the inner main tubular element, which is made of a completely different alloy.

Furthermore, it can be noted that in the present application (see, for example, the paragraph beginning at page 6, line 33 and the paragraph beginning at page 9, line 4), a possible protective inner layer is described. This layer is relatively soft (ductile) and therefore has a low content of alloying elements. Such a layer is often called a liner or a barrier layer. The skilled artisan readily recognizes that such an inner protective layer is essentially thinner than the main cladding tube. Such a layer is normally only about 10% of the thickness of the whole tube. See, for example, the articles by Rosenbaum *et al.* and Dahlbäck (only the first few pages of which are included) disclosed in conjunction with this Response. Both of these articles describe cladding tubes having inner protective layers. These layers are said to have a thickness of about 10% of the total thickness (see, for example, the Rosenbaum article at the first paragraph on page 118 and the Dahlbäck article at the last paragraph on page 873 (the first page)). Similar inner protective layers are described in the patent literature. Although in the patent literature quite wide ranges often are described, it is generally described that these layers should constitute only about 5-30% of the total thickness (or less). Consequently, it is clear to the skilled artisan that the inner layer described and claimed in the present application only constitutes a small part of the total thickness of the tube, and that the cladding tube with the alloy claimed in the pending claims actually constitutes the main part of the total tubular element (or the whole element if no

inner layer is present). The Applicants have not attributed a “special definition” to the term *cladding tube* as suggested by the Examiner. Rather, as evidenced by these references, the Applicants have used the term as it is used in the art. For the same reasons, the Examiner’s overbroad interpretation is not reasonable.

Furthermore, even for the outer layer Mardon ‘048 does not disclose the present alloy, as has been previously explained. Moreover, the Examiner is wrong in stating that the alloy of Mardon ‘048 is specific. Even in the examples given in the table in column 3 in Mardon ‘048, no specific example is given; rather, only ranges for the different elements are stated in each example. Moreover, five different alloying elements are discussed in the table - each of which is specified by a range (four different elements in each example). There is therefore a very large number of options to choose between for a person who would like to produce the tube disclosed by Mardon ‘048. First, which of the three examples stated in the table must be chosen. Then a specific content within the range given in the table has to be chosen for each element. There is, therefore, in principle an infinite number of alloys to choose between, as each element is defined by a range and the amount of four different elements has to be decided. Consequently, a person skilled in the art is not “clearly and unambiguously” taught by Mardon ‘048 to choose the very extreme values for tin and niobium in the second example in the table, and if such an artisan is not taught to use this example and these very extreme values, then the instantly claimed alloy cannot be considered to be taught (or even suggested) by Mardon ‘048.

In view of the foregoing, the Examiner’s rejections under 35 U.S.C. § 102 to the claims are believed to be overcome.

Claim Rejections Under 35 U.S.C. § 103

In sections 9-14 of the Office Action, the Examiner rejected claims 13, 22, 23, and 35-40 under 35 U.S.C. § 103 in view of varying combinations of Mardon '048, Mardon '541, and Van Swam. Specifically, the Examiner rejected:

- claims 13 and 35 in view of Mardon '048,
- claim 38 in view of Mardon '048 modified by Mardon '541,
- claims 22, 23, 36, and 37 in view of Mardon '048 modified by Van Swam, and
- claims 39 and 40 in view of Mardon '048 modified by Mardon '541 and Van Swam.

It is well settled that for a rejection of a claim under 35 U.S.C. § 103 to be proper, each and every recitation of the claim must be present in the cited reference(s). See, for example, MPEP § 2143.03. It is also well settled that for a rejection of a claim under 35 U.S.C. § 103 to be proper, there must be some suggestion or motivation to modify a reference or combine reference teachings. See, for example, MPEP § 2143.01. When so modifying a reference, the proposed modification cannot render the prior art unsatisfactory for its intended purpose or change the principle of operation of a reference. See, for example, MPEP § 2143.01. The modification must support a reasonable expectation of success with some degree of predictability. See, for example, MPEP § 2143.02. Finally, the source of the suggestion or motivation to modify a reference cannot be the Applicants' own disclosure. See, for example, MPEP § 2143. For at least the reasons stated below, the Examiner's rejections of the claims do not satisfy these burdens.

The Rejection of Claims 13 and 35 in View of Mardon '048

The remarks provided above regarding the anticipation-based rejections of claims 13 and 35 in view of Mardon '048 are equally applicable here, and are therefore incorporated herein.

Additionally, the Applicants traverse the Examiner's contention that they "ha[ve] failed to provide a full showing of unexpected results showing that the presently claimed range provides an unexpected result over the ranges of Mardon et al." The Applicants have previously submitted three declarations of Magnus Limbäck. Each of these declarations is highly relevant to the non-obviousness of the present invention, and each establishes that the present invention provides unexpected and advantageous results.

Regarding the declaration of Magnus Limbäck that was submitted with the Response to the January 28, 2005 non-final Office Action and attached to the Substitute Appeal Brief as Exhibit A, the declaration establishes that the presently disclosed and claimed alloy has surprising new advantageous properties. In particular from the experiments that are explained in connection with figure C, the advantageous properties of the alloy according to the present invention are clear. Furthermore, the inventors of the present invention have found that an alloy according to the present invention has such properties concerning, for example, strength and creep, that the alloy is very suitable to use for the whole cladding tube, or at least for the main part of such a tubular element. Because the alloy also has very advantageous properties concerning corrosion resistance, as is clear from the declarations, it is not necessary to provide such a cladding tube with any outer protective duplex layer. Consequently, it is clear that the inventors of the present invention have provided an important step forward in the design of suitable cladding tubes to be used in nuclear reactors. In this technical field it is moreover very important to provide materials with good properties such that the cladding tubes can be used for a long time without being at risk of degradation.

Regarding the declaration of Magnus Limbäck that was submitted with the Response to the December 24, 2003 non-final Office Action and attached to the Substitute Appeal Brief as

Exhibit B, the declaration shows via comparative data that compositions prepared using the Applicants' specific ranges have unexpected beneficial results.

Regarding the declaration of Magnus Limbäck that was initially submitted with the Substitute Appeal Brief and attached thereto as Exhibit C, the declaration further establishes the benefits of the presently disclosed and claimed composition over known compositions, including that of Mardon '048.

In section 16 of the Office Action, the Examiner opines that the tests conducted and described in the declarations are not adequate. The Applicants submit that it is time consuming and expensive to perform tests in this technical field. Nonetheless, the Applicants have performed some tests as shown in the declarations. Of particular note is the declaration signed by Magnus Limbäck on April 26, 2005 (submitted with the Response to the January 28, 2005 non-final Office Action and attached to the Substitute Appeal Brief as Exhibit A). Figure A of this declaration, for example, indicates the unexpected advantage of increasing the tin content from 0.3 to 0.7; Mardon '048 does not disclose such an amount of tin.

Furthermore, it should be noted that a single autoclave test may be sufficient to show that a material is not suitable, but individual autoclave tests are normally not sufficient in order to show that a material is suitable for use in a real nuclear reactor. The Applicants have therefore combined a number of different autoclave tests in order to optimize (by combining the results from the different tests) the content of different alloying elements, in order to provide an alloy that is robust and that has very good corrosion resistance in a real reactor environment (see, for example, the penultimate page in the declaration signed April 26, 2005). As is clear from the declarations, this has led to the conclusion that it is important both to have a tin content above 0.65 and an iron content above 0.30. Mardon '048 never suggests that it is important to fulfill

this requirement. Thus, the Applicants have clearly and fully demonstrated the unexpected results of the presently disclosed and claimed invention.

For at least these reasons, the rejections of the claims are improper and must be withdrawn.

*The Rejection of Claim 38 in View of Mardon '048
Modified by Mardon '541*

The shortcomings of Mardon '048 have already been discussed. It should be noted, however, that Mardon '048 explicitly states that no chromium should be present in the outer layer (which is the portion of the reference discussed by the Examiner). See col. 3, lines 21-22.

Regarding Mardon '541, it is initially noted that the Examiner is also discussing the thinner outer layer (although this layer is shown to be quite thick in the schematic figure, it is clear that this layer should be thin; see, for example, the abstract, where 10-25% is mentioned). However, as discussed before, the presently disclosed and claimed invention is concerned with the main layer (or the whole tube if no inner liner layer is present). For at least this reason, Mardon '541 is not relevant. Furthermore, Mardon '541 explicitly suggests that the layer in question should contain chromium (see the examples and claims). This very clearly contradicts the teachings of Mardon '048. Furthermore, Mardon '541 discloses the use of silicon only in connection with one of the alloy compositions described therein (see col. 2, lines 22-28 and claims 2 and 5). This alloy composition includes chromium and also a higher amount of oxygen than the alloys disclosed in Mardon '048. A person skilled in the art would not be led to select one particular element (silicon) out of context and add this element to a completely different alloy, like the one discussed in Mardon '048, particularly because the different elements in an alloy interact with each other in a complicated manner. It is only with hindsight knowledge of

the Applicants' present invention that somebody would come up with the idea of combining the two documents as suggested by the Examiner. This, of course, is impermissible.

Furthermore, Mardon '541 clearly teaches away from the present invention. As mentioned above, the Examiner refers to the thinner outer layer, not the main layer. Furthermore, contrary to the Applicants' invention, Mardon '541 suggests the use of chromium. Moreover, the suggested amount of oxygen is higher (1900-2300 ppm; see, for example, the claims) when the alloy contains tin, iron, and chromium. On the other hand, if niobium is used as the only added element, then the oxygen content can be lower (see col. 2, lines 44-51 and col. 4, line 51 to col. 5, line 18). Also, silicon is only suggested in Mardon '541 in connection with an alloy that includes chromium and no niobium and that has a higher amount of oxygen (1900-2300 ppm). Mardon '541 therefore clearly leads a person skilled in the art *away* from the present invention. Moreover, Mardon '541 only mentions "up to 200 ppm Si." Mardon '541 never suggests that the silicon content should be below 120 ppm or between 50 and 120 ppm.

Thus, the rejection of claim 38 is improper and must be withdrawn.

*The Rejection of Claims 22, 23, 36, and 37 in View of
Mardon '048 Modified by Van Swam*

The Examiner reiterates prior rejections of these claims. The Applicants therefore incorporate their prior remarks regarding the same. Moreover, these claims are further allowable based on the allowability, established above, of the independent claims from which these claims depend.

*The Rejection of Claims 39 and 40 in View of Mardon '048
Modified by Mardon '541 and Van Swam.*

Each of the references relied upon here by the Examiner have been discussed in detail either herein or in previously filed remarks. Mardon '048 and Mardon '541 teach the use of a traditional alloy, like Zircaloy 4 or zirconium with 1% niobium, for the inner main tubular

element. Van Swam, on the other hand, teaches a completely different kind of inner layer that always contains bismuth, or a three layer structure (see figure 2B) where the middle layer contains bismuth. Van Swam thus explicitly teaches alternatives to the traditional alloys (see col. 3, lines 13-17). Because this document explicitly teaches alternatives to the layer with the traditional alloys used in Mardon '048 and Mardon '541, Van Swam cannot (without impermissible hindsight) be combined with the Mardon references as suggested by the Examiner.

Furthermore, the Examiner suggests adding the inner layer of the Van Swam tube to the inner circumference of the Mardon '048 tube. This would mean that the layer would be added to the inner main tubular element in Mardon '048. However, the Examiner has previously discussed the outer layer of Mardon '048. According to present claims 39 and 40, it is clear that the inner circumference of the cladding tube defined in claim 38 is provided with the layer in question. It is therefore clear that there is no intermediate layer between the alloy defined in claim 38 and the layer mentioned in claims 39 and 40. Thus, it is therefore not possible to arrive at the subject matter of claims 39 and 40, even with the non-obvious combination of references suggested by the Examiner.

Thus, the rejections of claims 39 and 40 are improper and must be withdrawn.

Conclusion of Remarks Regarding the Obviousness Rejections

In view of the foregoing, the Examiner's rejections under 35 U.S.C. § 103 of the claims are believed to be overcome.

Newly Added Claims

The Applicants have added claims 41-43 above. These claims are similar to claims 13, 22, and 23, respectively, but without specifying the amounts of oxygen and silicon that may be present. No new matter is added.

Additional Fees

The Commissioner is hereby authorized to charge any insufficiency, including a \$450 two-month extension fee and a \$200 extra independent claim fee, or credit any overpayment associated with this application to Bingham McCutchen LLP Deposit Account No. 19-5127 (order no. 4193780011).

Conclusion

Claims 41-43 have been added. Claims 13, 22, 23, and 35-43 are pending in the application, and are believed to be in condition for allowance. In view of the foregoing, all of the Examiner's rejections of the claims are believed to be overcome. The Applicants respectfully request reconsideration and issuance of a Notice of Allowance for all claims. Should the Examiner feel further communication would help prosecution, the Examiner is urged to call the undersigned at the telephone number provided below.

Respectfully Submitted,



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